

### **REMARKS**

This is a full and timely response to the outstanding FINAL Office Action mailed October 17, 2008. The Examiner is thanked for the thorough examination of the present application. Upon entry of this response, claims 1-14, 29-42 and 57 are pending in the present application. Applicants respectfully request consideration of the following remarks contained herein. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

#### **Response to Claim Rejections Under 35 U.S.C. § 103**

The USPTO has the burden under section 103 to establish a *prima facie* case of obviousness according to the factual inquiries expressed in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). The four factual inquiries, also expressed in MPEP §2141, are as follows:

- (A) Determining the scope and contents of the prior art;
- (B) Ascertaining the differences between the prior art and the claims in issue;
- (C) Resolving the level of ordinary skill in the pertinent art; and
- (D) Evaluating evidence of secondary considerations.

For a proper rejection of the claim under 35 U.S.C. §103, the cited combination of references must disclose, teach, or suggest all elements / features of the claim at issue. See, e.g., *In re Dow Chemical*, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988) and *In re Keller*, 208 U.S.P.Q.2d 871, 881 (C.C.P.A. 1981). Claims 1, 3, 5-9, 13, 14, 29, 31, 33-37, 41, 42 and 57 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Chu et al.* (U.S. Pat. No. 6,934,345, hereinafter "*Chu*") in view of *Ross et al.* (U.S. Pat. No. 5,652,799, hereinafter "*Ross*"). Claims 2, 4, 30 and 32 are

rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Chu* in view of *Ross* as applied to claims 1 and 29, and in further view of *Lai* (U.S. Pat. No.7,042,969). Claims 10-12 and 38-40 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Chu* in view of *Ross* as applied to claims 1 and 14, and in further view of *Bergmans* (U.S. Pat. No. 4,905,254). For at least the reasons set forth below, Applicants traverse the rejections set forth.

#### **A. Claims 1, 3, 6-9, 13, and 14**

Applicants respectfully submit that independent claim 1 patentably defines over *Chu* in view of *Ross*, for at least the reason that the combination fails to disclose, teach, or suggest the features emphasized below in claim 1.

Claim 1, as amended, recites:

1. A method for reducing interference due to handshake tones in the frequency domain, the method comprising the steps of:  
receiving an input signal  $X_i[q]$  in the frequency domain at bin  $q$  and time-symbol  $t$ , wherein the input signal has a short correlation time component and a long correlation time component;

**attaining near zero correlation for the short correlation time component, wherein attaining near zero correlation for the short correlation time component comprises generating a delayed signal by delaying the input signal by a time-symbol value  $N$ , wherein  $N$  is an integer such that the generated delayed signal is  $X_{i-N}[q]$ ;**

**generating a prediction signal with long correlation properties based at least in part on the delayed signal;**

comparing the input signal and the prediction signal; and  
reducing a variance between the input signal and the prediction signal.

(Emphasis added). As indicated above, Applicants have amended claim 1 to further define the claimed embodiment. (Claim 5 has been canceled.) Applicants submit that no new matter is added by the amendment. Claim 1 now recites the step of “attaining

near zero correlation for the short correlation time component" in addition to the limitation "wherein attaining near zero correlation for the short correlation time component comprises generating a delayed signal by delaying the input signal by a time-symbol value  $N$ , wherein  $N$  is an integer such that the generated delayed signal is  $X_{t-N}[q]$ ." As set forth in the present disclosure, the short correlation time component of a particular signal is difficult to predict while the long correlation time component is more predictable. In this regard, claim 1 (as amended) is directed to attaining near zero correlation for the short correlation time component in the input signal, and generating a prediction signal with long correlation properties based at least in part on the delayed signal. This is significant as crosstalk signals due to handshake tones, for example, tend to exhibit long correlation times. Thus, NEXT and FEXT interference due to handshake tones are reduced.

Applicants respectfully submit that neither *Chu* nor *Ross* discloses the features emphasized above in claim 1. In rejecting claim 1, the Office Action relies on the primary *Chu* reference to teach generating a delayed feature. In particular, the Office Action refers to block 175 in FIG. 7 and cites col. 11, lines 53-57. Component 175 in FIG. 7 is a symbol delay block which provides a delay to the signal output by the sample 125. *Chu* specifies that "The parameters  $m_1$  and  $m_2$  are modifiable, with  $m_1$  greater than or equal to  $m_2$ , and in the preferred embodiment,  $m_1 = m_2 = 1$ , providing trellis and tentative error signals having a delay of one unit symbol time period (with symbol delay block 175 also providing a unit symbol delay ( $m_2 = 1$ ))." (Col. 11, lines 53-57). *Chu* also states that "The second training error signal ( $e_2(n-m_2)$ ) 185 is a delayed error signal, where the delay  $m_2$  (of blocks 175 and 176) matches the trellis 140 look-back

depth of the data mode.” (Emphasis added; col. 13, lines 30-33). As set forth in these text passages, *Chu* teaches of incorporating a delay of one unit symbol time period ( $m_2=1$ ). Further, this delay  $m_2$  matches the trellis look-back depth of the data mode. *Chu*, however, fails to disclose or suggest attaining near zero correlation for the short correlation time component, wherein attaining near zero correlation for the short correlation time component comprises generating a delayed signal by delaying the input signal by a time-symbol value  $N$ , wherein  $N$  is an integer such that the generated delayed signal is  $X_{t-N}[q]$ . *Chu* also fails to disclose generating a prediction signal with long correlation properties based at least in part on the delayed signal. Moreover, *Ross* fails to address these deficiencies.

Accordingly, Applicants respectfully submits that independent claim 1 patently defines over *Chu* in view of *Ross* at least the reason that *Chu* in view of *Ross* fails to disclose, teach, or suggest the highlighted features in claim 1 above. Furthermore, Applicants submit that dependent claims 3, 6-9, 13, and 14 are allowable for at least the reason that these claims depend from an allowable independent claim. See, e.g., *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

## **B. Claims 29 – 42**

Applicants respectfully submit that independent claim 29 patently defines over *Chu* in view of *Ross*, for at least the reason that the combination fails to disclose, teach, or suggest the features emphasized below in claim 29.

Claim 29 recites:

29. A system for reducing interference due to handshake tones in the frequency domain, the system comprising:  
an input for receiving an input signal in the frequency domain

having a short correlation time component and a long correlation time component;

**a delay module for generating a delayed signal by delaying the input signal by a delay value equal to an upper bound of the short correlation component;** and

a filter for generating a prediction signal based at least in part on the delayed signal;

wherein the input signal and the prediction signal are compared and a variance between the input signal and the prediction signal is reduced.

(Emphasis added). Applicants have amended claim 29 to further define the delay module. In particular, claim 29 now recites “a delay module for generating a delayed signal by delaying the input signal by a delay value equal to an upper bound of the short correlation component.” The Office Action again relies on the primary *Chu* reference to disclose this feature. As discussed above for claim 1, component 175 in FIG. 7 is a symbol delay block which provides a delay to the signal output by the sample 125. *Chu* specifies that “The parameters  $m_1$  and  $m_2$  are modifiable, with  $m_1$  greater than or equal to  $m_2$ , and in the preferred embodiment,  $m_1 = m_2 = 1$ , providing trellis and tentative error signals having a delay of one unit symbol time period (with symbol delay block 175 also providing a unit symbol delay ( $m_2 = 1$ )).” (Col. 11, lines 53-57). *Chu* also states that “The second training error signal ( $e_2(n-m_2)$ ) 185 is a delayed error signal, where the delay  $m_2$  (of blocks 175 and 176) matches the trellis 140 look-back depth of the data mode.” (Emphasis added; col. 13, lines 30-33). Applicants respectfully submit that incorporating a delay of one unit symbol time period ( $m_2=1$ ) that matches the trellis look-back depth of the data mode is not equivalent to generating a delayed signal by delaying the input signal by a delay value equal to an upper bound of the short correlation component. The Office Action, in fact, concedes that *Chu* fails to even disclose an input signal having a short correlation time component and long correlation

time component. The Office Action instead relies on the secondary *Ross* reference to disclose these features. The *Ross* reference, however, fails to address the deficiencies expressed above for the *Chu* reference as *Ross* fails to disclose a delay value equal to an upper bound of the short correlation component. The Office Action asserts that *Ross* discloses “a delay can be introduced which is greater than the short correlation time of the broadband signals but shorter than the long correlation time of the narrowband noise so that the long correlation noise component can be attenuated.” (Office Action, page 7). In this regard, Applicants submit that *Ross* fails to disclose a delay value equal to an upper bound of the short correlation component.

Applicants respectfully submit that independent claim 29 patently defines over *Chu* in view of *Ross* for at least the reason that *Chu* in view of *Ross* fails to disclose, teach, or suggest the highlighted features in claim 29 above. Furthermore, Applicants submit that dependent claims 30-42 are allowable for at least the reason that these claims depend from an allowable independent claim. See, e.g., *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

### C. Claim 57

Applicants respectfully submit that independent claim 57 patently defines over *Chu* in view of *Ross* for at least the reason that the combination fails to disclose, teach, or suggest the features emphasized below in claim 57.

Claim 57 recites:

57. A system comprising:  
means for receiving an input signal in the frequency domain  
having a short correlation time component and a long correlation  
time component;  
**means for generating a delayed signal by delaying the**

input signal by a delay value, wherein the delay value is equal to a time-symbol value  $N$ , wherein  $N$  is an integer such that the generated delayed signal is  $X_{t-N}[q]$ , wherein  $X_t[q]$  is the input signal at bin  $q$  and time-symbol  $t$ , and wherein the value  $N$  is based on an upper bound of the short correlation time component;

means for generating a prediction signal with a high correlation value based at least in part on the delayed signal;  
means for comparing the input signal and the prediction signal; and  
means for reducing a variance between the input signal and the prediction signal.

(Emphasis added). On page 8, the Office Action applies the same rationale used in rejecting claim 29 to reject claim 57. With reference to the *Chu* reference, *Chu* specifies that “The parameters  $m_1$  and  $m_2$  are modifiable, with  $m_1$  greater than or equal to  $m_2$ , and in the preferred embodiment,  $m_1 = m_2 = 1$ , providing trellis and tentative error signals having a delay of one unit symbol time period (with symbol delay block 175 also providing a unit symbol delay ( $m_2 = 1$ )).” (Col. 11, lines 53-57). *Chu* also states that “The second training error signal ( $e2(n-m_2)$ ) 185 is a delayed error signal, where the delay  $m_2$  (of blocks 175 and 176) matches the trellis 140 look-back depth of the data mode.” (Emphasis added; col. 13, lines 30-33). Applicants respectfully submit that incorporating a delay of one unit symbol time period ( $m_2 = 1$ ) that matches the trellis look-back depth of the data mode is not equivalent to setting a delay value equal to a time-symbol value  $N$ , wherein  $N$  is an integer such that the generated delayed signal is  $X_{t-N}[q]$  . . . and wherein the value  $N$  is based on an upper bound of the short correlation time component. Moreover, Applicants submit that *Ross* fails to address these deficiencies. Accordingly, Applicants respectfully submit that independent claim 57 patently defines over *Chu* at least the reason that *Chu* fails to disclose, teach, or suggest the highlighted features in claim 57 above.

**D. Claims 2, 4, 30, and 32**

Claims 2 and 4 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Chu*, in view of *Ross*, further view of *Lai*. As set forth above, Applicants submit that independent claim 1, from which claims 2 and 4 depend, is patentable over *Chu* in view of *Ross*. Furthermore, *Lai* fails to address the deficiencies expressed above for *Chu* and *Ross*. As such, Applicants submit that independent claim 1 is patentable over the combination of *Chu*, *Ross*, and *Lai*. Accordingly, dependent claims 2 and 4 are allowable for at least the reason that these claims depend from an allowable independent claim.

Claims 30 and 32 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Chu*, in view of *Ross*, further view of *Lai*. As set forth above, Applicants submit that independent claim 29, from which claims 30 and 32 depend, is patentable over *Chu* in view of *Ross*. Furthermore, *Lai* fails to address the deficiencies expressed above for *Chu* and *Ross*. As such, Applicants submit that independent claim 29 is patentable over the combination of *Chu*, *Ross*, and *Lai*. Accordingly, dependent claims 30 and 32 are allowable for at least the reason that these claims depend from an allowable independent claim.

**E. Claims 10-12 and 38-40**

Claims 10-12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Chu*, in view of *Ross*, further view of *Bergmans*. As set forth above, Applicants submit that independent claim 1, from which claims 10-12 depend, is patentable over *Chu* and *Ross*. Furthermore, *Bergmans* fails to address the deficiencies expressed above for



*Chu* and *Ross*. As such, Applicants submit that independent claim 1 is patentable over the combination of *Chu*, *Ross*, and *Bergmans*. Accordingly, dependent claims 10-12 are allowable for at least the reason that these claims depend from an allowable independent claim.

Claims 38-40 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Chu*, in view of *Ross*, further view of *Bergmans*. As set forth above, Applicants submit that independent claim 29, from which claims 38-40 depend, is patentable over *Chu* and *Ross*. Furthermore, *Bergmans* fails to address the deficiencies expressed above for *Chu* and *Ross*. As such, Applicants submit that independent claim 29 is patentable over the combination of *Chu*, *Ross*, and *Bergmans*. Accordingly, dependent claims 38-40 are allowable for at least the reason that these claims depend from an allowable independent claim.

**CONCLUSION**

Applicants respectfully submit that all pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephone conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

No fee is believed to be due in connection with this amendment and response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 50-0835.

Respectfully submitted,

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